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THE USE OF WESTERN RED CEDAR IN REFORESTATION BY DIRECT SEEDING

By

C. S. Schopmeyer

Western red cedar has been little used in the reforestation program of the Northern Rocky Mountain region mainly because of the difficulty of raising nursery stock and getting adequate establishment in the field. Among the commercially valuable species of this region, cedar ranks high being surpassed only by western white pine. Hence, the inclusion of more cedar in the forestation program would be desirable if adequate establishment is made possible at a reasonable expense.

For forestation by direct seeding, western red cedar seeds have the advantage of being small and thus perhaps less susceptible to rodent molestation than the larger-seeded species, western white pine and ponderosa pine. The species has the disadvantage, however, of a slow rate of growth during the first few years after germination and thus being very susceptible to drought and insolation injury especially during the first year.

Plots on five different kinds of sites in the Coeur d'Alene and Kaniksu National Forests were sown with seed of western red cedar to determine which of the sites are suitable for artificial establishment of the species. Further objectives in this study were to test the hypothesis that the small seeds of this species are unattractive to the rodents of this region and to compare the results of spring and fall sowing. The selected sites are as follows:

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A. Freshly broadcast burned area on a north-facing slope with silt loam soil. Upper Sands Creek, Deception Creek Experimental Forest, Idaho.

B. Freshly broadcast burned area on flat ground with slightly podsolized sandy loam soil. Kalispell Creek, Kaniksu National Forest, Idaho.

C. Four-year-old broadcast burned area on a north-facing slope with silt loam soil lightly covered with a mixture of herbaceous and shrubby species at the time of sowing. Western white pine was planted on the area in the spring of 1935. Lower Sands Creek, Deception Creek Experimental Forest, Idaho.

D. North-facing slope under a 30-year-old sapling stand of western white pine. Soil is a silt loam with much rock. Ames Creek, Deception Creek Experimental Forest, Idaho.

E. Northwest-facing slope covered with a dense growth of ceanothus and willow brush. Soil is a silt loam. Benton Creek, Priest River Experimental Forest, Idaho.

On each of the selected areas, 9 sample plots were established at intervals of approximately 3 chains using a 3x3 arrangement. Each plot contained 50 seed spots arranged in 10 rows of 5 spots each with rows as well as spots within rows spaced 8 feet apart. In each plot, 25 spots were sown in the fall of 1938 and 25 more in the spring of 1939. About 25 seeds were sown in each spot and covered with mineral soil to a depth of approximately 1/8 inch. With this arrangement of plots, a sample of 225 spring-sown spots and 225 fall-sown spots is provided on each area with a means of determining the significance of differences between spring and fall sowing on each area and for either spring or fall sowing between any two areas. Germination and first-year survival data on the 5 areas, expressed as percentages of the total number of spots having one or more seedlings, are summarized in table 1 for both spring and fall sowing.

No consistent differences in germination occurred between spring and fall sowing, but on four of the five sites, fall sowing resulted in a significantly higher survival than did spring sowing. On the fifth area, the brushfield, no seedlings survived; hence, no comparison is available. The evidence is sufficient, however, to prove that fall sowing of western red cedar is superior to spring sowing for regeneration by direct seeding.

Table 1.--Germination and first-year survival on western red cedar plots

Site description	Season of sowing	Germination[1/]	Survival[1/]
		Percent	Percent
A. Fresh broadcast burn on north-facing slope	Fall	98	92
	Spring	97	80
B. Under sapling stand of western white pine on north-facing slope	Fall	99	84
	Spring	88	53
C. Four-year-old burn on north-facing slope	Fall	96	79
	Spring	96	41
D. Fresh broadcast burn on flat	Fall	52	33
	Spring	58	28
E. Brushfield of ceanothus and willow on northwest-facing slope	Fall	88	0
	Spring	0	0

1/ Number of spots with one or more seedlings expressed as a percentage of the total number of spots sown.

Germination was sufficiently high to establish the fact that rodent molestation of seed spots is not an important factor in direct seeding of this species.

Since fall sowing resulted in better survival than spring sowing, the relative suitability of the sites for seeding can logically be based on the results of fall sowing only. The survival data in table 1 show that on sites A and B where no competing vegetation existed, and on site C where the growth of brush and herbaceous vegetation was not dense, survival and stocking were excellent. On site D where insolation and resultant surface soil drying appeared to be critical factors in the establishment of cedar, the observed stocking of 33 percent, or 220 trees per acre, is below that of a successful plantation which is designated in this region as 250 or more trees per acre. On the ceanothus and willow brushfield no cedar seedlings survived. The apparent cause of this failure was lack of available surface soil moisture resulting from loss of water by transpiration of the brush and evaporation from the soil surface. Site was not replicated in this experiment, hence the results apply only to the specific sites studied and not to similar sites in general.

Three tentative conclusions were derived from these first-year results.

1. Artificial regeneration of western red cedar by direct seeding in spots without protection from rodents is possible.

2. On three of the five sites studied, soil moisture and surface soil temperature were not limiting factors in first-year survival of cedar seedlings grown from fall-sown seed.

3. On the three successfully seeded areas fall sowing resulted in 27 percent greater stocking at the end of the first growing season than did spring sowing.